THE SUBORDER CHORIPLACINA STAROBOGATOV & SIRENKO, 1975 WITH A REDESCRIPTION OF *CHORIPLAX GRAYI* (H. ADAMS & ANGAS, 1864) (MOLLUSCA: POLYPLACOPHORA)

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Summary

GOWLETT-HOLMES, K. L. (1987) The suborder Choriplacina Starobogatov & Sirenko, 1975 with a redescription of *Choriplax grayi* (H. Adams & Angas, 1864). (Mollusca: Polyplacophora). *Trans. R. Soc. S. Aust.* **111**(2), 105-110, 29 May, 1987.

The suborder Choriplacina Starobogatov & Sirenko, 1975 is reevaluated and redefined as a suborder of the order Neoloricata. The sole living member of this suborder, *Choriplax grayi*, is redescribed and its habitat discussed. The family Afossochitonidae is reviewed and placed in synonymy with the Acanthochitonidae. *Afossochiton* is placed in the Acanthochitonidae. *Lirachiton* is placed in synonymy with the subgenus *Bassethullia* of *Notoplax* in the Acanthochitonidae. Glyptochitonidae is recognised and contains the genus *Glyptochiton*.

KEY WORDS: Chiton, Polyplacophora, Choriplacina, Choriplacidae, *Choriplax grayi*, Afossochitonidae, Acanthochitonidae, Glyptochitonidae.

Introduction

The suborder Choriplacina was erected by Starobogatov & Sirenko (1975) to accommodate the two monogeneric families, Glyptochitonidae (Carboniferous) and Choriplacidae (Recent). However, both families were regarded as synonyms of Afossochitonidae by Van Belle (1975, 1981, 1983), Ferreira (1981) and Kaas & Van Belle (1985), who placed them in the suborder Lepidopleurina, based on characters of the shell (the animal of the Choriplacidae being then unknown).

Starobogatov & Sirenko (1975) placed *Choriplax grayi* in the Choriplacina because of its reduced tegmentum, but Van Belle (1975, 1983) and Ferreira (1981) placed this species in the Afossochitonidae (Lepidopleurina) because of its unslit insertion plates, regarding the reduced tegmentum as of generic value only.

The recent discovery of several complete specimens of *C. grayi* has provided the opportunity to fully redescribe this species and reexamine its systematic position. Consquently it is necessary to reevaluate the suborder Choriplacina Starobogatov & Sirenko, 1975, based on the characters of *Choriplax grayi* (H. Adams & Angas, 1864), the only known extant species.

The following abbreviations are used: AM, Australian Museum, Sydney; BMNH, British Museum (Natural History), London; NMV, Museum of Victoria, Melbourne; SAM, South Australian Museum, Adelaide. Colour descriptions follow Kornerup & Wanscher (1978).

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Systematics

Class Polyplacophora Blainville, 1816

Order Neoloricata Bergenhayn, 1955

Suborder Choriplacina Starobogatov & Sirenko, 1975

Diagnosis: Small to large chitons with large unslit insertion plates in all valves; tegmentum much reduced; gills holobranchial.

Composition: This suborder contains the two monogeneric families Choriplacidae and Glyptochitonidae.

Family Choriplacidae Ashby, 1928

Diagnosis: Small to medium chitons with the characteristics of the suborder.

Composition: This family contains only the monotypic genus *Choriplax*, endemic to southern Australia.

Genus *Choriplax* Pilsbry, 1894

Microplax H. Adams & Angas, 1864, p. 194 (*Microplax grayi* H. Adams & Angas, 1864, original designation) not *Microplax* Fieber, 1861 (Hemiptera).

Choriplax Pilsbry, 1894, p. 139 (*Microplax grayi* H. Adams & Angas, 1864, original designation).

Diagnosis: Small to medium chitons; tegmentum sculpture granular; articulamentum very large, sutural laminae well developed, sinus obsolete; girdle large and fleshy; gills holobranchial, abanal.

Composition: This genus contains the single species *Choriplax grayi*.

Choriplax grayi (H. Adams & Angas, 1864)

FIGS 1-2

Microplax grayi H. Adams & Angas, 1864, p. 194; Angas, 1865, p. 58, pl. 2, fig. 16; Angas, 1867, p. 224; Pilsbry, 1892, p. 21, pl. 6, figs. 9-11.

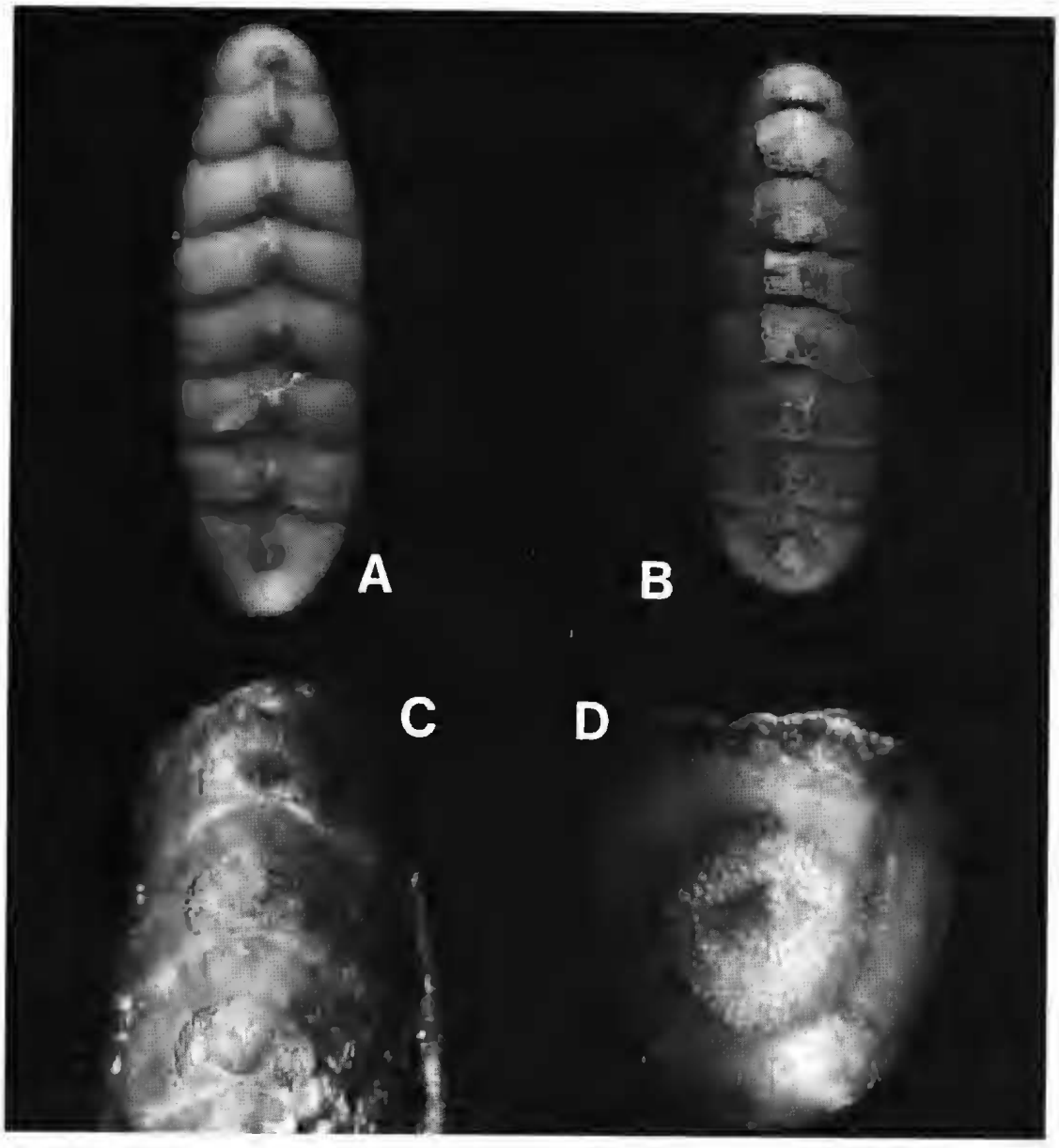

Fig. 1 *Choriplax grayi*. A. dry adult specimen, ×3.2 (SAM D17443); B. dry juvenile specimen, ×7 (SAM D16543); C. median valves, ×15 (BMNH 1877.11.7.2); D. posterior valve, ×20 (BMNH 1877.11.7.2).

Choriplax grayi (H. Adams & Angas, 1864); Pilsbry, 1894, p. 139; Ashby, 1924b, p. 383; Kaas & Van Belle, 1980, p. 56; Kaas & Van Belle, 1985, p. 204, fig. 95, map 16; Zeidler & Gowlett, 1986, p. 105.
Lepidopleurus (*Choriplax*) *grayi* (H. Adams & Angas, 1864); Ashby, 1918, p. 83.
Choriplax grayi pattisoni Ashby, 1921, p. 137, pl. 9, figs. 1a-c; Iredale & Hull, 1925, p. 100, pl. 11, fig. 28; Iredale & Hull, 1927, p. 90, pl. 10, fig. 28; Kaas & Van Belle, 1980, p. 56, 96; Zeidler & Gowlett, 1986, p. 105.
Choriplax grayi grayi (H. Adams & Angas, 1864); Iredale & Hull, 1925, p. 99, pl. 11, figs. 24-27; Iredale & Hull, 1927, p. 89, pl. 10, figs. 24-27.
Choriplax pattisoni Ashby, 1921; Ashby, 1924a, p. 331; Ashby, 1924b, p. 383; Cotton & Weeding, 1939; p. 188; Cotton & Godfrey, 1940; p. 540; Cotton, 1964, p. 85, fig. 542, fig. 96.

Material examined

Types: Holotype (BMNH 1877.11.7.2) dredged from Watsons Bay, Port Jackson, New South Wales, collected by G. F. Angas (anterior valve missing,

presumed lost). *Choriplax grayi pattisoni*: Holotype (SAM D15019) from Cape Banks, South Australia, collected by G. Pattison, 1918.

Other material: Tasmania: SAM D16542 (1) Fluted Cape, Bruny Island, S. A. Shepherd, 11.ii.1972. South Australia: SAM D17443 (1) Racecourse Bay, Port MacDonnell, T. & M. Young, 1968; SAM D16543 (2) Cape Northumberland, S. A. Shepherd, 19.vii.1974. Western Australia: NMV F51767 (2) Carnac Island, Perth, N. Coleman, 1971; AM C151131 (1) Carnac Island, Fremantle, N. Coleman, 18.xii.1971.

Species description: Small to medium chiton to 30 mm. Semicarinated; tegmentum discrete, very small; more or less posteriorly positioned on valves. Tegmentum colour variable: greyish-red to greyish-orange to light brown. Articulamentum white with pastel red under tegmentum and along posterior edge of valves. Girdle very large, fleshy (Fig. 2A); in dried specimens shrinking to thin horny covering (Figs 1A, 1B). Girdle colour in living animal matches tegmentum (Shepherd pers. comm.), dried or alcohol preserved specimens greyish-yellow to khaki.

Anterior valve tegmentum almost circular, with slight beak; sculptured with longitudinal, granular ridges posterior to beak, central area with radiating granular riblets over 1/3 of area, granules becoming coarser, then irregularly pustulose over remaining area. Median valves (Fig. 1C) tegmentum heart shaped, with distinct beak; sculptured like anterior valve. Posterior valve (Fig. 1D) tegmentum tear-drop shaped; antemucronal area with longitudinal, granular ridges; mucro granulose, in anterior 1/3 of valve; postmucronal area like anterior valve anterior to beak.

Girdle covers valves completely with transparent layer over tegmentum; subsurface with granular appearance; with sparse, 20–30 μm long, smooth, conical, calcareous spicules, wider at the base in a chitinous cup (according to Kaas & Van Belle 1985).

Gills (Fig. 2B) numerous, holobranchial, abanal, 23 to 28 medium to large ctenidia on each side.

Radula (Figs. 2C, 2D) with small weak central teeth, heads weak and asymmetrical; first lateral teeth broadly rounded, slightly narrower basally; major lateral teeth with wide tricuspidate heads, cusps sharp, of equal length.

Habitat: On the prostrate red alga *Sonderopelta coriacea* Womersley & Sinkora, 1981; occasionally on sponge on brown algae or on stones.

Range: Port Jackson, N.S.W. to Perth, W.A.; and south eastern Tas.

Remarks: This species was known for many years from the two type specimens (Kaas & Van Belle 1985), which had never been compared together. Ashby (1921) distinguished his new subspecies *Choriplax grayi pattisoni* from the nominate subspecies by its greater width and its proportionately smaller tegmentum. He elevated his subspecies to specific rank (Ashby 1924a) after examining the holotype of *C. grayi* in the British Museum, but did not actually compare the two holotypes. Kaas & Van Belle (1985) synonymised the two taxa, which is in agreement with my findings.

Kaas & Van Belle (1985), who have not examined the holotype of *C. grayi pattisoni*, state that the proportionately smaller tegmentum of this specimen is an artifact of Carpenter's (in Pilsbry 1892) erroneous measurements of the holotype of *C. grayi*. However, they appear to misunderstand the proportions involved, as they state that the tegmentum of the holotype of *C. grayi pattisoni* is nearly 14% larger than that of the holotype of *C. grayi*, but ignore the fact that the former specimen is 50% larger than the latter, so that the ratio of tegmentum to total size is in fact smaller. The holotype of *C. grayi* (BMNH 1877.11.7.2) is a juvenile shell with a proportionately larger tegmentum than the holotype of *C. grayi pattisoni* (SAM D15019), which is an adult specimen. After examining the series of specimens available, it is apparent that the tegmentum is produced at an early stage of growth and then does not increase in size. The articulamentum continues to increase in size, so that the tegmentum in an adult shell (Fig. 1A) is proportionately much smaller than in a juvenile (Fig. 1B), and is more central on the valves.

The habitat of this species has been in doubt for many years. The first specimen found (BMNH 1877.11.7.2) was collected on a stone (Angas 1867), but of the other eight specimens known, two were found washed ashore with kelp (SAM D15019, D17443), one was found on sponge on brown algae by a diver (AM C151131) and five were found on red algae by divers (SAM D16542–3; NMV F51767). The last five specimens were all pink in colour, matching the host plant, when collected. The host plant was identified for three specimens (SAM D16542–3) as the red alga *Sonderopelta coriacea*. The identity of the host plant of two of the W.A. specimens (NMV F51767) is unknown, and could not be determined from the preserved sample. Previously, *C. grayi* had been recorded as epiphytic on kelp (Ashby 1921; Cotton & Godfrey 1940), in particular on *Macrocystis porifera* (Cotton 1964). This arose because the holotype of *C. grayi pattisoni* was found washed ashore with this kelp, and because the colour of the

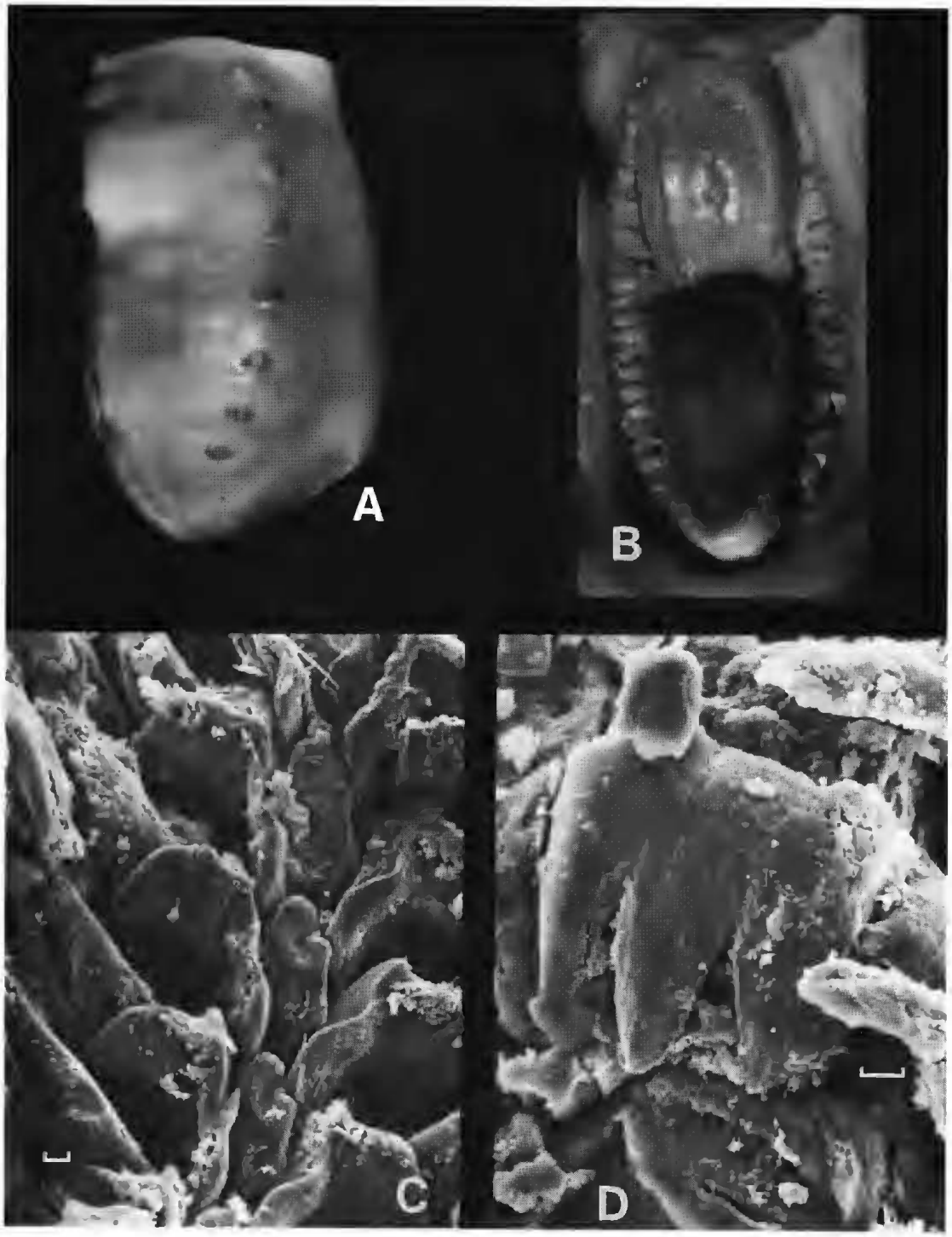

Fig. 2. *Choriplax grayi* (SAM D16542). A. dorsal view of spirit specimen, ×3.5; B. gills, ×4.8; C. radula, scale bar = 10 μm; D. major lateral tooth cusp, scale bar = 10 μm.

dried girdle was very similar to that of the kelp, the above authors assumed this to be the host plant.

The records from Tas. and W.A. are notable range extensions for the species, and new records for the faunas of those states.

Discussion

The family Afossochitonidae Ashby, 1925 was defined by Van Belle (1975, 1981, 1983), Ferreira (1981) and Kaas & Van Belle (1985) as containing the genera *Afossochiton* Ashby, 1925 (Miocene, Pliocene), *Lirachiton* Ashby & Cotton, 1939 (Pliocene), *Choriplax* (Recent) and *Glyptochiton* De Koninck, 1883 (Carboniferous). The distinguishing feature of the family as defined by these authors is the presence of unslit insertion plates in all valves.

The type specimens and any other material in SAM collections of all species of *Afossochiton* and *Lirachiton* were examined to determine the position of these species and their relationship to *Choriplax grayi*. All of these specimens are incomplete, and many are in a poor state of preservation.

The members of the genus *Afossochiton* have tegmental form and sculpture identical with the genus *Acanthochitona* (Acanthochitonidae: Acanthochitonina), but are distinguished by raised ridges on the well developed insertion plates where grooves and slits would be on the latter genus. *Afossochiton* is defined as lacking insertion plate slits, but the worn and incomplete nature of the insertion plates makes it impossible to confirm the presence or absence of slits. I regard *Afossochiton* as a genus within the family Acanthochitonidae, and Afossochitonidae as a synonym of this family. More complete specimens of *Afossochiton* with well preserved insertion plates are required to verify the position of this genus.

The single species in *Lirachiton*, *L. inexpectus* (Ashby & Cotton 1939) appears to be very closely related to the extant species *Notoplax* (*Bassethullia*) *matthewsi* (Bednall & Pilsbry, 1894) (Acanthochitonidae), a relationship also recognised by Cotton & Godfrey (1940) and Cotton & Weeding (1941). *Lirachiton* is defined as lacking insertion plate slits, but I believe the slits are not visible on the available specimens due to the extremely worn and incomplete state of their insertion plates. As *L. inexpectus* has the same combination of pustulose sculpture and grooves as the members of the subgenus *Bassethullia*, I regard *Lirachiton* as a junior synonym of this subgenus.

In *Choriplax grayi*, the structure of the valves and girdle, and the position of the gills, demonstrate that it is a unique extant species with characters differing from all existing suborders recognized by Kaas & Van Belle (1980, 1985) and Van Belle (1981, 1983).

The large number of holobranchial and abanal gills preclude its inclusion in the suborder Lepidopleurina, characterised by few posterior gills only (Smith 1960; George & George 1979), and the combination of characters — large, unslit insertion plates, reduced tegmentum, holobranchial gills — preclude its assignment to any of the recognized suborders within the order Neoloricata. Recognition of the family Choriplacidae Ashby, 1928 and the suborder Choriplacina Starobogatov & Sirenko, 1975 is therefore justified.

Starobogatov & Sirenko (1975) and Sirenko & Starobogatov (1977) regard the Choriplacina as a suborder of the Lepidopleurida in the subclass Neoloricata. Their classification includes many orders and suborders, the majority of which are poorly defined. In view of the poor definition and ambiguity of many of the taxa of these authors, I prefer to follow the higher classification of Van Belle (1983), which is well defined and consistent within the characters used.

Choriplacina is here regarded as a fourth suborder of the order Neoloricata, because its combination of characters place it within this order but distinguish it from the three suborders recognized by Van Belle (1983). I believe that the gills and girdle, as well as the insertion plates, are important characters in the higher systematics of the Polyplacophora. If the gills and girdle are ignored as distinguishing characters in the higher systematics of chitons, as proposed by Van Belle (1983) and Kaas & Van Belle (1985), then the remaining characteristics of the valves do not appear to be sufficient to justify the division of the orders of the Polyplacophora into suborders.

Regarding Glyptochiton, no specimens were available for study, however, based on descriptions and illustrations of the genus and species (Kirkby & Young 1867; De Koninck 1883; Van Belle 1983), it would seem to be sufficiently distinctive to warrant recognition of the family Glyptochitonidae Starobogatov & Sirenko, 1975. This family appears to be related to the Choriplacidae, because of its large, unslit insertion plates and much reduced tegmentum. A detailed examination of *Glyptochiton* is required to determine its true place.

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